

# Memorandum

## Vermont Department of Public Service

**To:** Hans Mertens  
**From:** Steve Litkovitz  
**Subject:** VELCO NRP, § 202(f) Determination  
**Date:** July 1, 2004

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The Department is considering VELCO's request, under 30 V.S.A. § 202(f), for a determination that VELCO's proposed Northwest Vermont Reliability Project (NRP), presently being considered by the Public Service Board in Docket No. 6860, is consistent with the Department's 1994 Twenty Year Electric Plan (the Plan). This memo addresses the question of whether the NRP, both as originally proposed and the reroute, is consistent with the relevant engineering and transmission requirements of the Plan. As described below, I believe that the proposed NRP is consistent with the relevant engineering and transmission requirements of the Plan.

### Provision of Efficient Electric Service<sup>1</sup>

Among the primary goals described in the Plan is the provision of efficient electric service. Specifically, the Plan discusses various methods by which transmission and distribution systems can be planned and operated to lower line losses. Among the most effective strategies for lowering line losses is to increase the voltage levels of existing transmission paths. The proposed NRP would accomplish this goal along two separate paths. First, the corridor between West Rutland and New Haven, which presently contains a 115 kV line, would be upgraded with the addition of a 345 kV transmission line. Second, the 46 kV and 34.5 kV lines between New Haven and Queen City would be removed and replaced by a 115 kV transmission line. Both of the proposed transmission lines would result in lower line losses on the VELCO system.

### Removal of Constraints<sup>2</sup>

The Plan states that bulk transmission planning must address current and future constraints for the import and export of power. The proposed NRP would help accomplish this goal by

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<sup>1</sup>See the Plan, pages 1-1, 5-19 to 5-23.

<sup>2</sup>See the Plan, page 5-5.

relieving transmission congestion in the northwest section of the state. This would allow for the importation of lower cost generation and the lowering of congestion costs.

#### Provision of Reliable Electric Service<sup>3</sup>

The Plan calls for electric service that is reliable, i.e., service to customers with minimal interruptions in terms of frequency and duration. The primary purpose of the proposed NRP is to enhance the reliability of the transmission grid in Vermont, especially in the northwest portion of the state; to reduce the likelihood of outages; and to reduce the likelihood of voltage collapse which could result in outages over a relatively wide area. As indicated in the Department's testimony submitted in the Board's proceeding, the proposed NRP is the best strategy in which to obtain this desired reliability.

#### Provision of Safe Electric Energy<sup>4</sup>

The Plan calls for the protection of public health and safety in the distribution of electric energy. With regard to construction safety standards, VELCO would construct the electric facilities of the proposed NRP in a manner consistent with the National Electric Safety Code. This meets the standard for safety established by the Public Service Board in its Rule 3.500. Safety issues with respect to electromagnetic fields are addressed below.

#### Aesthetic Considerations<sup>5</sup>

The Plan calls for the careful consideration of overall visual aesthetics when constructing and locating electric lines. As indicated in the Department's testimony submitted in the Board's proceeding, aesthetic criteria will be met on the condition that VELCO construct the elements of the NRP in a manner consistent with the recommendations contained in the testimony of Department witness David Raphael.

#### Provision of Quality Power<sup>6</sup>

The Plan calls for the provision of electric service with minimal impairments in power quality. The concept of power quality goes beyond the basic considerations of outage frequency and outage duration and accounts for measures of voltage variation including sags, undervoltage and overvoltage conditions, surges, and harmonic distortion. The proposed NRP would enhance power quality of the grid in several ways. For example, the

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<sup>3</sup>See the Plan, pages 1-1, 1-7 to 1-8, 5-6 to 5-8.

<sup>4</sup>See the Plan, page 1-3.

<sup>5</sup>See the Plan, page 5-7.

<sup>6</sup>See the Plan, pages 1-1, 5-8 to 5-12.

extension of 345 kV north to New Haven would provide for a “stiffer” system, i.e., a system less vulnerable to voltage sags following contingencies. Also, installation of a dynamic VAR device at the Granite substation would help ensure that low voltage conditions are avoided following contingencies.

#### Utilization of Geographic Information Systems<sup>7</sup>

The Plan calls for transmission planning to employ Geographic Information Systems (GIS) formats. GIS is an electronic system that allows users to collect, manage, and analyze large volumes of geographical data and associated descriptive information. VELCO employed GIS in its planning of the NRP.

#### Prudent Avoidance of Electromagnetic Fields<sup>8</sup>

The Plan calls for the prudent avoidance of electromagnetic fields from transmission lines. Based on the testimony of the Vermont Department of Health submitted in the Board’s proceeding, the proposed NRP is not inconsistent with this provision.

#### Utilization of Existing Corridors<sup>9</sup>

The Plan calls for improvements to the bulk transmission system to utilize existing transmission corridors to the fullest extent possible. The majority of transmission lines in the proposed NRP would be constructed within existing corridors. The only significant deviation from this principle would be the Vergennes reroute that VELCO has proposed in order to avoid substantial aesthetic impacts in the Vergennes downtown and river basin areas.

#### Upgrades to Existing Facilities<sup>10</sup>

The Plan calls for upgrading existing transmission facilities to accommodate higher power transfer levels as the preferred method of increasing transmission capacity. The proposed NRP utilizes this strategy where feasible, namely in the New Haven to Queen City corridor where existing 46 kV and 34.5 kV subtransmission lines are removed and replaced with a new 115 kV transmission line.

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<sup>7</sup>See the Plan, pages 5-13 to 5-14, 8-3 to 8-4.

<sup>8</sup>See the Plan, pages 1-7, 5-12 to 5-13, 8-3.

<sup>9</sup>See the Plan, pages 5-19, 8-13.

<sup>10</sup>See the Plan, pages 5-19, 8-13.

#### Least-Cost Equipment Acquisition<sup>11</sup>

The Plan calls for transmission equipment to be acquired in a least-cost manner taking into consideration life-cycle energy loss costs. Specifically, the NRP would be the acquisition of conductors and transformers. VELCO proposes to use 1272 ACSR conductor for the proposed transmission lines. These are large conductors sized to meet system and contingency conditions that might arise over the next 30 to 40 years. It is highly unlikely that the cost of acquiring and mechanically supporting a larger size conductor than 1272 ACSR would be cost-effective on the basis of incremental loss savings. With regard to transformers, VELCO has traditionally purchased its transformers using a methodology that accounts for cost of transformer losses. The Plan's requirement for least-cost equipment acquisition would be met on the condition that VELCO continue this practice for transformer acquisition.

#### Utilization of Electronic Power Control Devices<sup>12</sup>

The Plan calls for consideration of the use of high power electronic control devices, often referred to as FACTS devices, as a method of controlling transmission system voltage and stability following contingencies. The proposed NRP does consider the use of such devices, namely a static compensator or STATCOM, as part of the proposed Granite substation upgrade. VELCO has testified in Docket No. 6860 that it will evaluate the use of both a STATCOM and a more traditional device known as a synchronous condenser at this location.

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<sup>11</sup>See the Plan, pages 8-11 to 8-12.

<sup>12</sup>See the Plan, page 5-20.